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| 10/519,472 | 12/29/2004 | Keisuke Suzuki | 040302-0425 | 2691 |

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| EXAMINER | |
|---|---|
| CHUO, TONY SHENG HSIANG | |
| ART UNIT | PAPER NUMBER |
| 1795 | |

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| 05/22/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/519,472 | SUZUKI, KEISUKE | |
| | Examiner | Art Unit | |
| | Tony Chuo | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/9/09 has been entered.

### *Response to Amendment*

2. Claims 1-16 are currently pending. The amended claims do overcome the previously stated 102 and 103 rejections. However, upon further consideration, claims 1-16 are rejected under the following new 103 rejections.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al (US 2002/0192519) in view of Ichinose et al (US 2004/0115487).

The Fujita reference discloses a fuel cell system and a method of controlling a fuel cell system comprising: fuel cell "200"; a CPU of a power control unit "700" that provides a required electric power (target power) for the fuel cell "200"; a voltage sensor "868" for detecting an actual output voltage of the fuel cell and a current sensor "870" for detecting an actual output current of the fuel cell, wherein these two sensors combine to form a detector for detecting output power from the fuel cell; and a power control unit "700" (controller) comprising: a CPU (target current computing unit) that calculates an electric current Ifc (target current) corresponding to the required electric power Ef (target power) directly from a power-current characteristic map obtained from a nominal output characteristic of the fuel cell, wherein the nominal output characteristic of the fuel cell is a reference output characteristic (See paragraphs [0153],[0159],[0173],[0180] and Figure 12, upper graph).

However, Fujita et al does not expressly teach a command output power computing unit which calculates a command output power of the fuel cell from the product of the target current and the actual output voltage. The Ichinose reference teaches the concept of a fuel cell system control unit (command output power computing unit) that determines the power command value (command output power) from the product of the feed-back DC voltage value (actual output voltage) and the current command value (target current) (See paragraph [0062]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fujita method of controlling a fuel cell system to include a step of calculating a command output power of the fuel cell from the product

of the target current and the actual output voltage in order to prevent the overloading of the fuel cell by limiting the current control command value (See paragraph [0080]).

5. Claims 2-8 and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al (US 2002/0192519) in view of Ichinose et al (US 2004/0115487) as applied to claims 1 and 9 above, and further in view of Ueda et al (US 2001/0024746) and Sugiura et al (US 2002/0064697). In addition, the Fujita reference discloses a power control unit "700" that controls the valves "202" & "204" and compressor "504" to control the pressure and flow rate of the respective fuel gas and oxidant gas (See paragraph [0124]). It also discloses a temperature sensor "872" for detecting the temperature of the fuel cell (See paragraph [0152]). It also discloses output characteristic data for various temperatures of the fuel cell (See Figure 20). It also discloses a CPU that performs the process of setting the fuel cell required electric power (target power) by calculating from the sum of the driving required electric power Ed and an auxiliary machine electric power Es (See paragraph [0175]). In other words, the CPU calculates the target power by taking into account power consumption of auxiliary equipment for power generation of the fuel cell.

However, Fujita et al as modified by Ichinose et al does not expressly teach a target gas operation point computing unit which calculates a target gas operation point of the fuel gas and the oxidant gas from the target current based on gas operation point characteristics which provides pressure and flow rate of the respective fuel gas and oxidant gas for an output current of the fuel cell, wherein the gas control system controls the pressure and flow rate of the respective fuel gas and oxidant gas based on the

target gas operation point calculated by the target gas operation point computing unit. The Ueda reference discloses a control unit "18" (target gas operation point computing unit) that detects the pressure and flow rate of the reformed fuel supplied to the fuel cell and also detects pressure and flow rate of the oxidizing agent supplied to the fuel cell, wherein the target pressure of the fuel gas and oxidant gas is calculated based on a pressure-flow characteristic that provides pressure "P1" and flow rate "Q" of the respective reactant gas for an output current "I" of the fuel cell and then controls the pressure and flow rate of the fuel gas and oxidant gas based on the target pressure calculated by the control unit (See paragraph [0014], [0070],[0088],[0105],[0107]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fujita/Ichinose fuel cell system to include a target gas operation point computing unit which calculates a target gas operation point of the fuel gas and the oxidant gas from the target current based on gas operation point characteristics which provides pressure and flow rate of the respective fuel gas and oxidant gas for an output current of the fuel cell, wherein the gas control system controls the pressure and flow rate of the respective fuel gas and oxidant gas based on the target gas operation point calculated by the target gas operation point computing unit in order to provide a control system for a fuel cell that is capable of accurately controlling the pressure-flow characteristics of a reactant gas over a wide output range of the fuel cell (See paragraph [0009]).

However, Fujita et al as modified by Ichinose et al and Ueda el al does not expressly teach an output characteristic learning unit which learns an actual output

characteristic of the fuel cell based on the output power detected by the detector and corrects the reference output characteristic of the fuel cell based on the learned actual output characteristic, wherein target current computing unit creates a revised power-current characteristic based on the reference output characteristic of the fuel cell corrected by the output characteristic learning unit, and wherein the target current computing unit calculates the target current at the target power based on the revised power-current characteristic. The Sugiura reference discloses an electronic control unit "ECU" (output characteristic learning unit) that learns an actual output characteristic of the fuel cell based on the output voltage detected by voltage sensor and output current detected by the current sensor over an extended period of time and executes an output characteristic correction process that corrects the output characteristic of the fuel cell based on the voltage detected by the voltage sensor and the current detected by the current sensor, thereby creating a revised power-current characteristic based on the reference output characteristic of the fuel cell corrected by the electronic control unit (See paragraphs [0056],[0059] and Figure 7). Examiner's note: The previous output characteristics line shown in Figure 7 is construed as a reference output characteristic of the fuel cell. Since the actual voltage and actual current are known values, then the output power is calculated from the product of the voltage and the current.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Fujita/Ichinose/Ueda target current computing unit to include an output characteristic learning unit which learns an actual output characteristic of the fuel cell based on the output power detected by the detector

and corrects the reference output characteristic of the fuel cell based on the learned actual output characteristic, wherein target current computing unit creates a revised power-current characteristic based on the reference output characteristic of the fuel cell corrected by the output characteristic learning unit, and wherein the target current computing unit calculates the target current at the target power based on the revised power-current characteristic in order to more accurately estimate the output characteristic of the fuel cell and thereby enhance the overall energy efficiency by optimizing the operation of the fuel cell (See paragraph [0008],[0009]).

***Response to Arguments***

6. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795